Bioecological Aspect of *Lakepe* (*Betta raja*) in Natural Habitat of Bandar Tinggi Village, Rantau Selatan District, Labuhan Batu Regency

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Abstract. Lakepe (*Betta raja*) is a wild fish species inhabiting water region in Labuhanbatu regency. The fishes are commonly known to inhabit steady and unpolluted streams. The aquatic environmental condition and its ecology will determine the survivability and breeding of Betta raja in its natural habitat.A study of its ecological aspect is needed to obtain any physicochemical characteristics of natural habitat which may act as limiting factor to *Betta raja* presence. In this study, physicochemical characteristics of water are measured, i.e temperature (T), velocity, pH, dissolved oxygen (DO), biological oxygen demand (BOD), chemical oxygen demand (COD), total dissolved solid (TDS), and total suspended solid (TSS). The environmental condition are measured in the field (*in situ*) while other parameters, i.e DO, BOD, TDS, and TSS are analyzed in the laboratory. The results showed that the physicochemical characteristics of B. raja habitat are: T (26ºC), velocity (0.05 m/s), DO (6.9 mg/L), BOD (3.27 mg/L), COD (8.26 mg/L), TDS (22.1 mg/L), and TSS (5.1 mg/L). The sizes of wild caught B. raja are ranged between 6.3–94.0 cm with body masses of 1.1–4.8 g.

Keywords: *Betta raja*, Freshwater Ecology, Labuhanbatu, Stream, Wild Fish

Abstrak. *Lakepe (Betta raja) adalah spesies ikan liar yang menghuni wilayah perairan di Kabupaten Labuhanbatu. Ikan-ikan tersebut umumnya dikenal hidup di aliran yang stabil dan tidak terpolusi. Kondisi lingkungan akuatik dan ekologinya akan menentukan kemampuan bertahan hidup dan pengembangbiakan Betta raja di habitat aslinya. Studi tentang aspek ekologisnya diperlukan untuk memperoleh karakteristik fisikokimia habitat alami yang dapat bertindak sebagai faktor pembatas terhadap keberadaan Betta raja. Kajian tentang aspek ekologis diperlukan untuk memperoleh karakteristik fisikokimia habitat alami yang dapat bertindak sebagai faktor pembatas terhadap keberadaan Betta raja. Dalam penelitian ini, karakteristik fisikokimia air diukur, yaitu suhu (T), kecepatan, pH, oksigen terlarut (DO), BOD, COD, total padatan terlarut (TDS), dan total padatan tersuspensi (TSS). Pengukuran kondisi lingkungan dilakukan secara in situ, sementara parameter lainnya, yaitu DO, BOD, TDS, dan TSS dianalisis di laboratorium. Hasil penelitian menunjukkan bahwa karakteristik fisikokimia habitat B. raja adalah: T (26 ˚C), kecepatan (0,05 m/detik), DO (6,9 mg/L), BOD (3,27 mg/L), COD (8,26 mg/L) , TDS (22,1 mg/L), dan TSS (5,1 mg/L). Ukuran Betta raja liar yang ditangkap berkisar antara 6,3–94,0 cm dengan massa tubuh 1,1–4,8 g.*

Kata Kunci: Betta raja, Ekologi Perairan Tawar, Ikan Liar, Labuhanbatu, Sungai

1. Introduction

Indonesia is regarded as the hotspot for endemic fighting fish species in the world. Around 73 fighting fish species (*Betta* spp.) can be found in the nature. Wild fighting fish may be classified into 13 group species based on their morphological characteristics [1]. In general, the morphological characteristic of *Betta* is the presence of pre-dorsal fin behind the temporal fin in

smaller size than anal fin, abdominal fin is ray-like filament and round in large size, while the caudal fin of mature fish is lanceolate [2].Recently, the wild fighting fishes are commonly hunted by breeders and collectors due to its authentic and aesthetic appearance leading to elevated price in the market trade. The selling price for certain species may reach from hundred-thousands to millions of rupiah based on its rarity [3].

Betta spp. also possess a unique organ named the labyrinth which helps them to acquire oxygen from the air. Ecologically, the members are known to inhabit calm streams, low dissolved oxygen water, dense vegetation, and they may lay their eggs in the nests or in its mouth cavity [4]. Wild fighting fish is rare nowadays in the natural habitat. Their natural habitat is within the forest deep, however the intensity of over-exploitation, aquatic pollution, and land conversion have threatened and limit their presence in the wild. Previous study has revealed a decrease in fish population of *B. persephone* due to forest fragmentation and conversion into agricultural and horticultural fields.

During our preliminary survey, we have found a species of *Betta*, namely *B. raja* or *lakepe* inhabiting the natural streams in Bandar Tinggi Village, Bila Hulu District, Labuhanbatu Regency. The specific ecological study on this species is still new and limited, leading to our further investigation of its natural habitat which support their presence in this water region. Our findings may be used as additional data in *Sumber Daya Ikan* (SDI) or fish resources management in Indonesia. The results may also be used as baseline data to the stakeholders in considering the natural habitat of *B. raja* as protected area in the future.

2. Methodology

This study was conducted from 10 to 11 March 2019. The sampling site was located in tourist site of Sirao-rao waterfall, at Bandar Tinggi Village, Bilah Hulu District, Labuhanbatu Regency, North Sumatra, Indonesia (Figure 1). The geographical coordinates for this study site is $2.99^0.55'41^0$E $2^0.5'39^0$ N.

Figure 1. Map location of study site

This study is an exploratory survey with descriptive analysis. Sampling of fighting fish was accommodated using fishing nets and rods. Fish samples were preserved and identified in

laboratory of Universitas Labuhanbatu using identification books [5]. Physicochemical characteristics were measured in the field and in the laboratory of *Balai Riset dan Standarisasi Industri Medan*. Biological parameters of *B. raja* measured in this study are: length-weight size and sex ratio.All numerical data are presented in means and figured in graphs using Microsoft Excel 2007.

3. Results and Discussions

3.1 Physicochemical characteristics of study site

The measurement of physicochemical characteristics in the natural habitat of *Betta raja* is presented in Table 1. According to Indonesian environmental quality standard, the habitat condition is still considered suitable or healthy with no indication of pollution to the natural habitat [6]. *Betta raja* and all fighting fishes are mostly affected by water condition and are known to inhabit freshwater habitats, i.e lake and calm stream [7]. Hence, the suitable environmental condition for fighting fish species are pH 6.0-7.0, *T* at 26-27^{o}C, and DO>3.0 ppm.

Table 1. Mean value of physicochemical characteristics of water quality

No	Parameter	Unit	Method	Value	Standard
1.	Temperature	^{o}C	Thermometer	26	> 25
2.	Velocity	m/s	Floating object & Stopwatch	0,05	-
3.	pH	-	pH Meter	6,4	5,9 - 6,9
4.	DO	mg/L	DO Meter	6,9	0 - 6
5.	BOD	mg/L	SNI 06-6989-15-2004	3,27	2 - 12
6.	COD	mg/L	SNI 06-2503-1991	8,26	10 - 100

Biological size of Betta raja

The specimen size of caught *Betta raja* in this study are ranged between 6.3 to 94 cm with body masses of 1.1 to 4.8 g (Figure 2). According to fish catch effort, there is no significant differences among sizes which indicate the equal size distribution among individu in *Betta raja* population. Majority of fishes sampled in this study are in mature condition.

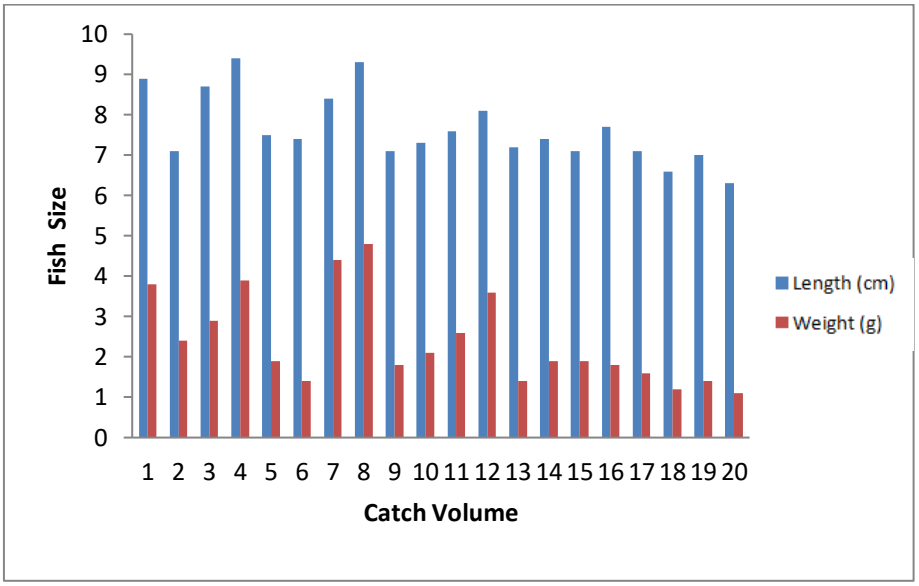

Figure 2. Histogram of length-weight condition of *Betta raja* based on catch volume

The catch volume is larger by fishing rods than fishing nets. The smaller hook size will attract most fish into approaching the fishing rods yield into larger volume and intense catchment [8]. The use of fishing nets in ineffective due to cryptic behavior of *B. raja* leading to difficulties in catchment.The length-weight relationship of *Betta raja* showed a determinant value of R^2 = 0.489. Based on its relationship, there is a significant correlation between length and body mass while other variables are considered as minor effects to the biological characters. Observation on length-weight relationship is important to obtain the fish growth and robustness [9]. Previous study has also reported the use of other determinant value (*k*), which indicate that the environmental condition did not affect the biological attributes of zebra fish in Beratan Lake. The study also pointed out that zebra fish grew without any competition in gaining food resources.

4. Conclusions

Based on our study, the environmental condition or ecological aspect of water region still support the population of *lakepe* (*Betta raja*) in natural stream in Labuhanbatu Regency. The majority of mature fishes caught from this area revealed that the fishesperform a good reproduction cycle and development hence this site may be considered as important habitat for the sustainability of *lakepe* in the future.

5. References

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